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Organizing for Space:
Creating a Trinitarian American Space Program –
A Historical Primer

by

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Biography

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Introduction

The space age began on 4 October 1957 when the Soviet Union launched the earth's first artificial satellite, *Sputnik*. Within four years the United States built upon preexisting foundations and created three separate space programs designed to meet the two primary challenges which presidential-level decision makers believed existed in the space arena: gathering strategic-level intelligence information from space on the Soviet Union and its allies, and garnering prestige on the international stage vis-à-vis the Soviet Union. But why did the US federal government operate and fund three separate and distinct space programs: a multifaceted and multifunctional military space program to fulfill a plethora of DOD requirements using a wide variety of orbital platforms, including some types of surveillance; a civilian and mostly scientific effort under the aegis of the National Aeronautics and Space Agency (NASA) which has often focused on the prestige projects; and a hybrid civilian-military National Reconnaissance Office (NRO) undertaking imagery collection for intelligence purposes and operating at the highest levels of classification? In essence, the Cold War generated two driving engines for the American space program: the quests for international prestige and the search for reliable strategic intelligence on the Soviet Union. But the Cold War also created a three-fold division within the American space program which still exists today, the components of which interacted within a complex matrix of support, coordination, and rivalry at the dawn of the space age.¹

Accordingly, this essay will attempt to answer two questions while probably raising many more. Why does the US continue to operate a trifurcated space program? And, what are the historical antecedents for this division of labor which has now persisted for almost half a

century? This paper will attempt to address these issues with the hope of achieving a second-order effect, namely, to arm the Air Force's policy makers with a historical case study of the government splitting its effort in what was (in the late 1950s and early 1960s when these decisions were made) a challenging new domain of Air Force operations: space. In turn, today's decision makers may then be able to draw applicable lessons (or at least a sense of historical humility) when confronting one of the Air Force's most vexing contemporary organizational challenges – whether or not to create an Air Force Cyber Command as the service's tenth and newest major command (which would have been the first new MAJCOM since AFSOC's creation in 1990 and AFRC's in 1997.)² As was the case at the dawn of the space age, this new AFCYBER MAJCOM would have arisen out of the need to master the complexities of the military's requirement to operate in a new domain – the electronic or informational arena referred to as 'cyberspace.' However, given the AF's recent decision to pull back from creating a MAJCOM for cyberspace operations and endorse only a new numbered air force (NAF)³, perhaps only one conclusion can be declared indisputable: today's organizational challenges associated with structuring cyberspace operations will almost certainly be as vexing as those associated with creating an American space program fifty years ago.

Reconnaissance as the Requisite Military Antecedent

The first part of the trinity comprising America's space program was the DOD's (and largely the Air Force's) and was initially focused on the notion of satellite reconnaissance.⁴ Top level policy makers of Eisenhower's era had been deeply influenced by the attack on Pearl Harbor and Eisenhower himself was ardently committed to gathering the intelligence necessary to prevent a recurrence. Accordingly, Eisenhower did create, fund and strongly support highly secretive programs such as the U-2 reconnaissance aircraft and reconnaissance satellites because

they offered the promise of peering behind the Iron Curtain.⁵ For answers to this challenge, Eisenhower turned to a group of academic and industrial scientists who would ultimately provide him invaluable advice concerning space policy for the remainder of his administration.

James R. Killian Jr. was the President of the Massachusetts Institute of Technology. He was also a member of Eisenhower's Science Advisory Committee (SAC). On 27 March 1954 Eisenhower tasked his SAC to undertake a "searching review of the whole status of our weapons development programs"⁶ with a special emphasis on ". . . the present vulnerability of the United States to surprise attack and ways whereby science and technology can strengthen our offense and defense to reduce this hazard."⁷ The responsible group became known as the Technological Capabilities Panel (TCP).⁸ Although relatively unknown, the TCP's February 1955 final report is one of the seminal documents of the Cold War and certainly of American military space policy. It (or its classified annexes) contained the recommendations that led to the Thor, Jupiter and Polaris intermediate range ballistic missiles (IRBM), to the supersecret U-2 reconnaissance aircraft, and supported reconnaissance satellite development.⁹ Its general section on intelligence gathering concluded

We must find ways to increase the number of hard facts upon which our intelligence estimates are based, to provide better strategic warning, to minimize surprise in the kind of attack, and to reduce the danger of gross overestimation or gross underestimation of the threat. To this end, we recommend adoption of a vigorous program for the extensive use, in many procedures, of the most advanced knowledge in science and technology.¹⁰

Quite simply, "The TCP report of 1955 set the pace and direction of American strategic policy for years to come,"¹¹ including space policy.

Consequently and shortly after the release of the TCP report, the Eisenhower administration promulgated its first and most important space policy document – NSC 5520,

“Satellite Program.” The guiding principle for the American space program which this document enshrined was the primacy of developing reconnaissance satellites and ensuring that these satellites enjoyed freedom of overflight of other countries. All other space policy considerations were subordinate. NSC 5520 explained that America’s effort to develop a small scientific research satellite was important because

it does represent a technological step toward the achievement of the large surveillance satellite, and will be helpful to this end *so long as the small scientific satellite program does not impede development of the large surveillance satellite*. . . . Furthermore, *a small scientific satellite will provide a test of the principle of ‘Freedom of Space.’* . . . Preliminary studies indicate that there is no obstacle under international law to the launching of such a satellite. . . . The U.S. can simultaneously exploit its probable technical capability for launching a small scientific satellite. . . , *to gain scientific prestige, and to benefit research and development in the fields of military weapons systems and intelligence*. The U.S. should emphasize the peaceful purposes of the launching of such a satellite, although care must be taken as the project advances not to prejudice freedom of action. . . [and] *to continue with its military satellite programs directed toward the launching of a large surveillance-type satellite when feasible and desirable*.

[DOD will] develop the capability of launching a small scientific satellite by 1958, *with the understanding that this program will not prejudice continued research directed toward large instrumented satellites for additional research and intelligence purposes, or materially delay other major Defense programs*. . . [and] *does not involve actions which imply a requirement for prior consent by any nation over which the satellite might pass in orbit, and thereby does not jeopardize the concept of ‘Freedom of Space.’*¹²

Given that the policy side of the reconnaissance satellite equation was established, what was the status of hardware portion of the effort? The military services, but most especially the Air Force, had conducted low-level feasibility studies of reconnaissance satellites since shortly after WWII.¹³ Under Eisenhower, momentum built so that on 16 March 1955 Headquarters United States Air Force (USAF) issued General Operational Requirement No. 80 officially ordering the development of an advanced reconnaissance satellite to provide continuous

surveillance of “preselected areas of the earth” in order “to determine the status of a potential enemy’s warmaking capability.”¹⁴ The Air Force was officially in the space business and the reason was reconnaissance. Nevertheless, spending was limited in July 1956 to \$3 million for FY57,¹⁵ described as “a major disappointment to all involved, since it was less than ten percent as much as was needed to go to full-scale development.”¹⁶ Indeed, the remainder of the pre-*Sputnik* progress of the military space program (which was comprised essentially of WS-117L, the name given to the Air Force’s reconnaissance satellite effort) can best be described as lean.¹⁷ Actual pre-*Sputnik* funding for WS-117L was \$4.7 million in FY56, \$13.9 million in FY57 and \$15.5 million in FY58 (which was greatly increased to \$65.8 million as a result of *Sputnik*).¹⁸

Nonetheless, a full appreciation of Eisenhower’s military space program and its focus on and preparation for reconnaissance satellites must recognize that satellites, of course, require a rocket or booster vehicle of some sort to launch them to the appropriate orbit. The boosters for the first several decades of the American space program would be the IRBMs and intercontinental ballistic missiles that Eisenhower funded relatively lavishly. Research and development funds for ballistic missiles, the necessary precursor for any space program, are shown below, in millions of dollars:¹⁹

pre-1953	1953	1954	1955	1956	1957	1958
< \$1	3	14	161	515	1380	1349

This investment meant that when the reconnaissance satellites were ready for test and then operational launching, proven space boosters adapted from the DOD’s ballistic missile fleet would be too.²⁰

NASA as a Civilian Organization for Prestige-Oriented Space

In contrast to Eisenhower's enthusiastic embrace of satellite reconnaissance as a means of gathering strategic intelligence on the Soviet Union before, during and after the commencement of the space age, he was not enamored with the idea of huge expenditures for a space program attempting to win international prestige vis-à-vis the Soviets. The fundamental relationship between the space philosophy of the Eisenhower administration and that of the John Kennedy/Lyndon Johnson administrations is that while both shared an abiding concern with maximizing the effectiveness of intelligence gathering from space using photographic reconnaissance satellites, only Kennedy and Johnson subscribed to the notion that the quest for prestige in space was a legitimate pursuit. Accordingly, NASA's budget exploded under Kennedy and Johnson due to Kennedy's commitment in May 1961 to a manned lunar landing, ultimately titled Project Apollo.²¹

Immediately after *Sputnik's* launch the Eisenhower administration attempted to downplay the Soviet accomplishment and calm the public's growing sense of alarm. Rear Admiral Rawson Bennett, director of the Office of Naval Research, declared it was "a hunk of iron anybody could launch" while Eisenhower's chief of staff Sherman Adams quipped that "... the serving of science, not high score in an outer space basketball game, has been and still is our country's goal."²² Over time, however, Eisenhower concluded that his administration's prudent response to *Sputnik* would include the creation of NASA on 1 October 1958 as a new agency responsible for civilian pursuits in space and therefore the second of the three American space programs. Furthermore, NASA would assume responsibility for several preexisting space programs in the DOD, to include America's human spaceflight program soon to known as Project Mercury. Furthermore, under Kennedy and Johnson NASA's human spaceflight efforts included Project

Gemini as a sort of bridge between Mercury and Apollo, and Project Apollo itself as the actual lunar landing and return program.

Eisenhower remained adamant through the end of his tenure in January 1961 that the quest for prestige via human spaceflight was not worth what he termed “hocking our jewels.” On 20 December 1960 he received a report that it would cost between \$33-46 billion to conduct a manned lunar landing. George Kistiakowsky was the head of the President’s SAC which had researched and written the report and gave the briefing, recalls Eisenhower “just about blew a gasket. He was horrified.”²³ The National Security Council (NSC) minutes record his lament that “. . . the SPUTNIK complex impelled us to do everything yesterday. . . . He had to think about the country as a whole, the economy, and the other demands on the budget. He believed it might be necessary to establish an annual budgetary ceiling for space activities.” Kistiakowsky pointed out that “. . . to a large extent the objectives of the space program must be charged to the cold war. The Soviets had succeeded by propaganda in instilling the idea that achievements in space were an accurate over-all measure of a country’s scientific and technological potential.” To which Eisenhower replied, “. . . he could use \$1 billion to better advantage on some other aspect of the cold war.”²⁴ Clearly space in a general sense was not Eisenhower’s preferred tool for Cold War competition for prestige.

Much less did the particular idea of human spaceflight appeal to him as an appropriate instrument for prestige gathering. The 20 December 1960 meeting’s minutes explain, “The President said he was ready to say that he saw no scientific or psychological reason for carrying the man-in-space program beyond the MERCURY program. He thought the idea of a man on the moon was sheer Buck Rogers fiction. . . . The President said we were facing a difficult fiscal problem because our rate of expenditure was increasing faster than our economic growth.”²⁵ T.

Keith Glennan was NASA Administrator and his diary entry concerning this December 1960 meeting records Eisenhower's response to such huge sums for a lunar landing: "He couldn't care less whether a man ever reached the moon."²⁶ Accordingly, the NSC concluded the 20 December 1960 meeting by stating that "... further testing and experimentation will be necessary to establish whether there are any valid scientific reasons for extending manned space flight beyond the MERCURY program."²⁷

Clearly, then, at the end of his tenure, Eisenhower was convinced that human spaceflight should, at best, continue after Mercury contingent upon obtaining further scientific justification, but not for prestige-related reasons. At worst, human spaceflight might very well end completely after Mercury's conclusion, if no persuasive scientific reason for its continuation could be found. Human spaceflight was not an arrow in Eisenhower's Cold War quiver. As John Logsdon, dean of the space historians, has written, the situation in early 1961 for human spaceflight was "extremely gloomy."²⁸ While NASA was an established and viable organization conducting a healthy civilian space program at the end of the Eisenhower administration, it most certainly had no realistic hope of undertaking a lunar landing under the prevailing and negative presidential philosophy concerning using human spaceflight for prestige. Kennedy, however, would completely reverse this course and wholeheartedly endorse the notion of a lunar landing program conducted on virtually a crash basis and with generous funding.

Now that the Eisenhower administration's disinclination to endorse high levels of investment in the quest for prestige from human spaceflight and its enthusiastic endorsement of the concept of satellite reconnaissance are clear, the discussion turns to the major change which Kennedy made (and Johnson continued): embracing human spaceflight for prestige purposes and the sanctioning of Project Apollo and its goal of a manned lunar landing.²⁹ The major event

that seems to have forced Kennedy's hand was another spectacular Soviet first in space: on 12 April 1961 the Soviets launched the first human into space, Yuri Gagarin, who flew for 108 minutes in his Vostok spacecraft. Any number of historians cite "the enormous reaction of the public and the press to the Soviet man-in-space achievement," with striking parallels to the furor that erupted after *Sputnik* three-and-a-half years earlier.³⁰ Soviet Premier Nikita Khrushchev reportedly exclaimed, "Let the capitalist countries catch up with our country!" while the Central Committee of the Communist party claimed that the Gagarin flight "... embodied the genius of the Soviet people and the powerful force of socialism."³¹ On the day of the Gagarin flight Kennedy held a press conference during which he stated, concerning the string of Soviet space firsts since *Sputnik*, "However tired anybody may be, and no one is more tired than I am, it is a fact that it is going to take some time" to catch up with the USSR. The United States was behind and "... the news will be worse before it is better, and it will be some time before we catch up."³² Kennedy quickly tasked his vice president Lyndon Johnson, "... to be in charge of making an overall survey of where we stand in space" and to answer numerous questions, including:

1. Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip around the moon, or by a rocket to land on the moon, or by a rocket to go to the moon and back with a man? Is there any other program which promises dramatic results in which we could win?
2. How much additional would it cost?
3. Are we working 24 hours a day on existing programs? If not, why not? ... Are we making maximum effort?

Kennedy asked for a reply "at the earliest possible moment."³³

As Johnson was gathering information and opinions, Kennedy tipped his hand at a press conference on 21 April 1961 when he said, "We have to make a determination whether there is any effort we could make in time or money which could put us first in any new area. ... If we

can get to the moon before the Russians, we should. . . . I think we face an extremely serious and intensified struggle with the Communists.”³⁴ When all was said and done, the 8 May 1961 recommendations to Kennedy, over 25 pages long, were jointly written by Robert McNamara, Kennedy’s Secretary of Defense, and James Webb, his NASA Administrator. This document stands as the most important space policy document of the 1960s. Webb and McNamara stated that the fundamental objective for NASA’s civilian space program should be “manned lunar exploration in the latter part of this decade.” They explained that space projects can be undertaken for four reasons: scientific knowledge; commercial civilian value; military value; or national prestige. The United States was ahead in the scientific and military categories and had greater potential in the commercial arena but trailed in the space for prestige field. Therefore, “This nation needs to make a positive decision to pursue space projects aimed at enhancing national prestige. Our attainments are a major element in the international competition between the Soviet system and our own. . . . The non-military, non-commercial, non-scientific but ‘civilian’ projects such as lunar and planetary exploration are, in this sense, part of the battle along the fluid front of the cold war. Such undertakings may affect our military strength only indirectly if at all, but they have an increasing effect upon our national posture. . . . It is vital to establish specific missions aimed mainly at national prestige.”³⁵

The Webb/McNamara package endorsed a lunar landing before the end of the decade because it “. . . represents a major area in which international competition for achievement in space will be conducted It is man, not merely machines, in space that captures the imagination of the world.” The authors acknowledged a lunar landing “will cost a great deal of money” and require “large efforts for a long time.” Nevertheless, given that “the Soviets have announced lunar landing as a major objective of their program” the United States has little

choice if it wants to compete: “If we fail to accept this challenge it may be interpreted as a lack of national vigor and capacity to respond. . . . perhaps the greatest unsurpassed prestige will accrue to the nation which first sends a man to the moon and returns him to earth. . . . The exploration of space will not be complete until man directly participates as an explorer.”³⁶

Johnson quickly endorsed the Webb/McNamara conclusions and forwarded them to Kennedy because Kennedy had dispatched Johnson on a fact-finding tour of Southeast Asia. On 10 May 1961 Kennedy met with his close advisers to ratify the Webb/McNamara package forwarded by Johnson. McGeorge Bundy was Kennedy’s Special Assistant for National Security Affairs and recalled, “the President had pretty much made up his mind to go” and was not particularly interested in hearing arguments to the contrary. Kennedy approved the package exactly as McNamara and Webb had laid it out.³⁷ On 25 May 1961 Kennedy announced his decision to the nation in a speech titled “Special Message to the Congress on Urgent National Needs.”

Kennedy said all the actions he proposed related to the responsibility of America to be “the leader in freedom’s cause” because, “The adversaries of freedom plan to consolidate their territory – to exploit, to control, and finally to destroy the hopes of the world’s newest nations. . . . It is a contest of wills and purposes as well as force and violence – a battle for the minds and souls as well as lives and territory. And in that contest, we cannot stand aside.” Accordingly, Kennedy actually proposed many initiatives before detailing his lunar landing plan. He discussed measures “to turn recession into recovery,” to aide the economic and social progress of the developing nations, to increase NATO’s strength, to increase the American strategic deterrent, to triple United States civil defense expenditures, and to strengthen the Arms Control and Disarmament Agency.³⁸ In fact, the lunar landing decision was the final major point in his speech. Kennedy explained:

Finally, if we are going to win the battle that is now going on around the world between freedom and tyranny, the dramatic achievements in space which occurred in recent weeks should have made clear to us all, as did the sputnik in 1957, the impact of this adventure on the minds of men everywhere who are attempting to make a determination of which road they should take. . . . it is time to take longer strides – time for a great new American enterprise – time for this Nation to take a clearly leading role in space achievement, which in many ways may hold the key to the future on earth. . . . For while we cannot guarantee that we shall one day be first, we can guarantee that any failure to make this effort will make us last. . . . We go into space because whatever mankind must undertake, free men must fully share. . . . I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth.³⁹

Later that day at a NASA press conference featuring Webb and subordinate NASA leaders a reporter asked, “Is this an accelerated effort predicated on the assumption that we want to beat Russia to the moon.” NASA leaders replied simply, “Yes.”⁴⁰ Kennedy had clearly concluded that national prestige was an important element in national power because what other nations and people thought about American power “. . . was as important, if not more important, than the reality of that power. . . . A basic reason for the lunar landing decision was Cold War politics, phrased in terms of containing Soviet political gains from their space successes.”⁴¹ Human spaceflight became, under Kennedy, one expression of that power. Johnson’s earlier conclusion that, “Failure to master space means being second best in every aspect. . . . In the eyes of the world first in space means first, period; second in space is second in everything”⁴² became the Kennedy administration’s guiding policy for NASA’s civilian space program. Logsdon summarizes that the lunar landing decision “. . . is perhaps the ultimate expression of ‘technological anticommunism’ in terms of which way of life can best master nature, not control men.”⁴³

The NRO Emerged as a Civilian-Military Hybrid

In contrast to the opposite conclusions that Eisenhower and Kennedy reached concerning using human spaceflight for prestige, continuity between the Eisenhower and Kennedy/Johnson eras did prevail concerning reconnaissance satellites. This continuity makes possible a unified discussion of the third and final leg of the “stool” of the emerging American space program: the NRO, which was (and is) focused entirely on satellite reconnaissance. This organization was originally called the Office of Missile and Satellite Systems in the fall of 1960 but approximately a year later, during the Kennedy administration, it was renamed the National Reconnaissance Office. The NRO was then and still is under joint USAF-Central Intelligence Agency (CIA) management. Only in 1992 was even the very existence of the NRO officially declassified. Prior to the NRO’s creation America’s first reconnaissance satellite program was pulled out of the Air Force, reassigned to a joint USAF-CIA management team, and rechristened CORONA. It was CORONA, operating under its unclassified cover program called DISCOVERER, which conducted the first successful launch of an American reconnaissance satellite in August 1960. One analyst described this event as “. . . perhaps the most important development in military technology since the atom bomb. The spy satellite revolutionized the intelligence business.”⁴⁴

Among the numerous questions Eisenhower’s scientific advisers intensely studied after *Sputnik* were reconnaissance satellites.⁴⁵ After much discussion, early in February 1958 Eisenhower accepted a recommendation that a small part of the Air Force’s 117L program featuring a satellite with a returnable film capsule would be taken from the USAF and placed under joint management of Air Force Brigadier General Osmond Ritland and the CIA’s Richard Bissell for accelerated development. This was essentially the genesis of the NRO idea. Though designed as an interim program, CORONA in fact “. . . would become the backbone of our entire intelligence collection system for the next 12 years.”⁴⁶ Despite the difficulties posed by

numerous technical challenges and perfecting the procedure for aerial recovery of film capsules from space, the thirteenth CORONA launch on 13 August 1960 involved the successful recovery of a capsule from space (without film). The fourteenth CORONA launch on 18 August 1960 did carry a complete photographic system, took pictures, and had its film successfully recovered and processed.⁴⁷ This was truly a fortuitous event given that the US had been essentially “blind” and without any overhead intelligence data of the Soviet Union since Francis Gary Powers and his U-2 were shot down on 1 May 1960.

Before the NRO’s official establishment in late 1961, “The CORONA program operated under a loose, unstructured arrangement by which the CIA and the Air Force jointly ran the effort. . . . For a time the relationship worked well.”⁴⁸ But concern grew within the Eisenhower administration that two separate reconnaissance satellite programs existed: the joint CIA-USAF CORONA venture, and the independent Air Force effort called originally 117L (part of which had been extracted and rechristened CORONA), then renamed SENTRY, and finally SAMOS and designed to digitally transmit satellite images to a ground station (as opposed to ejecting a capsule containing actual photographic film). Science adviser George Kistiakowsky commented on the “. . . unbelievable chaos among the highly classified projects – the piling up of one project on top of another without any effective mechanism for evaluating even the potential usefulness of each.” In particular he said that the reconnaissance satellite area was “a very distressing situation” which by May 1960 involved “administrative chaos” and “technical troubles.”⁴⁹ Eisenhower finally stepped in and ordered Secretary of Defense Thomas Gates to recommend an overall management scheme and organizational structure for reconnaissance satellites. Gates in turn appointed a panel consisting of Kistiakowsky, Undersecretary of the Air Force Joseph

Charyk (who would become the NRO's first Director) and Deputy Director of DOD Research and Engineering John Rubel to conduct the actual investigation.⁵⁰

Kistiakowsky wrote that his group recommended a direct line of command from the Secretary of the Air Force to the officer in charge of the USAF's reconnaissance satellite program and that the joint CIA-USAF management of other reconnaissance satellite programs continue.⁵¹ Eisenhower approved these recommendations on 25 August 1960 and the Air Force created an Office of Missile and Satellite Systems to manage SAMOS in September.⁵² It was not until a year later that the Office of Missile and Satellite Systems was renamed the NRO with an organizational structure explicitly recognizing joint CIA-USAF management responsibility. A NRO historian explained that

on 6 September 1961, CIA and the Air Force officially signed a charter establishing a National Reconnaissance Program (NRP). Under that agreement, a covert National Reconnaissance Office (NRO) would finance and control all overhead reconnaissance projects. The NRO was to be managed by a joint directorship of the CIA and the Air Force reporting to the Secretary of Defense. . . . The Air Force provided the missiles, bases, and recovery capability for the reconnaissance systems. The CIA, in turn, conducted research and development, contracting, and security. The agreement also left the CIA in control of the collection program.⁵³

Finally, only one day after Eisenhower approved the Gates/Kistiakowsky recommendations that led to the NRO's creation, he also issued a directive establishing a new and entirely separate security classification system for reconnaissance satellites called TALENT-KEYHOLE.⁵⁴ From this point forward, virtually no primary sources concerning the NRO as an organization or reconnaissance satellites themselves (except CORONA) are available. Therefore, discussions of the NRO as the third organizational leg of the US space program (such as those speculating on continued Air Force-CIA managerial tension) or of reconnaissance satellites during the Kennedy and Johnson administrations rely almost wholly upon secondary,

speculative, and largely conjectural sources. Nevertheless, it is known that within days of its beginning, the Kennedy administration tightened and extended Eisenhower's policies on releasing information concerning reconnaissance satellites in particular and military space launches in general.⁵⁵ After a year, the Kennedy administration in general and the DOD in particular concluded their new policy of withholding more information on reconnaissance satellites was the proper policy and not only made it official but broadened it to include all military space launches.⁵⁶ In other words, the few people privy to information concerning the military space program could say or write virtually nothing about it. No United States official would even formally admit the United States operated reconnaissance satellites until President Jimmy Carter did so in 1978.⁵⁷

Apparently the Kennedy administration's increasing the already high security classifications surrounding reconnaissance satellites was an attempt to avoid provoking the USSR into threatening American reconnaissance satellites. Indeed, throughout 1961 and 1962 the Soviets waged a sort of diplomatic offensive in the United Nations and elsewhere against reconnaissance satellites. The United States denied satellite reconnaissance was espionage but the Soviet Union stopped its public relations campaign against it only in the latter half of 1963 because the USSR itself perfected and began employing its own reconnaissance satellites.⁵⁸ America and the Soviet Union signed no accord concerning the legality of satellite reconnaissance; there simply emerged an unstated, tacit understanding that both countries conducted and accepted the practice.⁵⁹

Finally, one should note that the NRO as the third component of America's space program continued to serve as a management structure under which the USAF and the CIA exhibited some degree of conflict in their administration of the nation's satellite reconnaissance

program through today. Albert Wheelon was a participant in the Kennedy-era NRO as the CIA's first Deputy Director for Science and Technology in 1963. In this capacity he was the chief architect of the CIA's space efforts and oversaw the CORONA program during his tenure. He reported that McNamara believed the CIA's role in the NRO should be confined to defining requirements, doing some advanced research and examining the film from the reconnaissance satellites. When Brockway McMillan became Undersecretary of the Air Force and therefore NRO Director, he tried to implement McNamara's desires by notifying the CIA he was transferring the CIA's responsibilities for CORONA to the Air Force. For a year Director of Central Intelligence John McCone remained undecided as to how to respond to the DOD drive for sole control of the NRO. However, Wheelon finally convinced McCone that the CIA should continue to play a strong role in the NRO: "After a period of readjustment in the expectations of the Defense Department, the partnership between CIA and the Air Force on CORONA resumed and served the country well to the end of the program in 1972."⁶⁰

Discussion of reconnaissance satellites into the Johnson era must rely almost wholly on secondary sources, due to the continuing secrecy surrounding specific space reconnaissance methods and systems. The most noteworthy declaration concerning space reconnaissance from the Johnson administration survives only because Johnson believed he was speaking off the record to a group of educators and government officials in Nashville, Tennessee, but apparently was not. He said in March 1967,

I wouldn't want to be quoted on this but we've spent 35 or 40 billion dollars on the space program. And if nothing else had come of it except the knowledge we've gained from space photography, it would be worth 10 times what the whole program cost. Because tonight we know how many missiles the enemy has and, it turned out, our guesses were way off. We were doing things we didn't need to do. We were building things we didn't need to build. We were harboring fears we didn't need to harbor.⁶¹

This enthusiastic presidential endorsement of space reconnaissance, and indirectly the unmanned satellites of the NRO, gives some indication of the importance of these space assets to America's Cold War efforts by the end of the 1960s. In essence, automated reconnaissance satellites became increasingly capable, developed a proven track record of performance, and became key players in arms control and disarmament verification.

Perhaps the only facet of the NRO and reconnaissance satellites as breathtaking as the security procedures surrounding them were the claims concerning the satellites' capabilities by the end of the 1960s or at least the capabilities under development in the late 1960s which debuted in the early 1970s. Philip Klass claimed in 1970 that "... current designs have cloud-cover sensors to prevent them from wasting film on targets obscured by weather, a valuable feature not found on the first photographic satellites. Still more advanced designs in the future are expected to provide real-time photographic and electromagnetic reconnaissance."⁶² Two years later Klass described the nation's newest reconnaissance satellites, often referred to as KH-9 or "Big Bird" as "nearing full operational status," delivering photographs with "fantastic resolution" with "resolution approximately twice that of previous designs, provid[ing] discrimination of individual persons from an altitude of more than 100 miles. Big Bird is designed to perform both the search-and-find and the close-look type missions that have required two different spacecraft." Given the fact that Klass stated the first Big Bird was orbited on 15 June 1971,⁶³ the system clearly would have been in development during the mid- to late-1960s.⁶⁴

Quite simply, the fundamental importance of reconnaissance satellites to national security and geopolitical stability in the early space age and throughout the Cold War seems certain. It may be an exaggeration to declare, "In simplest terms, there is strong reason for believing that observation from space is *the* most significant development in man's experience."⁶⁵

Nonetheless, even the most sober assessments make clear that, “The NRO produced, according to some estimates, nearly 90 percent of all intelligence data on the Soviet Union” since its creation in 1961. The NRO’s satellite systems “established, with considerable accuracy, the actual military capability and preparedness of the Soviet Union. Cost was rarely a question asked. The NRO mission held the highest priority. . . . There is little doubt that the NRO played a major role in the U.S. ‘victory’ in the Cold War.”⁶⁶ In other words, what it was technologically possible to do from space to gather intelligence data on the country’s enemies, the NRO, DOD and Air Force did.

Conclusion

As successful as the NRO was in gathering vital reconnaissance data from space, the space historian should acknowledge NASA’s accomplishments concerning the prestige factor of human spaceflight. After Kennedy’s assassination and despite the subsequent Vietnam imbroglio, Johnson dedicated sufficient resources to Project Apollo and completed Kennedy’s stated pledge to land a man on the moon and safely return him before the completion of the 1960s (and before the Soviets, who never managed the feat). Consequently, NASA at a minimum maintained America’s position and perhaps even surpassed that of the Soviet Union’s concerning the difficult-to-measure concept of international prestige. Therefore while possible unwieldy, sometimes duplicative, and undeniably expensive, in the final analysis the trinitarian American space program of NASA, the DOD and the NRO succeeded in the securing both prestige and reconnaissance from space, and thereby made a vital contribution to America’s ultimate political/ideological and technological victory in the Cold War.

Throughout the first half of 2008 the Air Force was marching toward the goal of creating a Cyber Command with an initial activation date of 1 October 2008.⁶⁷ However, due to a

complex mix of changes in the service's top military and civilian leaders coupled with actions required to address shortcomings in the Air Force's nuclear enterprise, cyberspace operations are currently programmed to take place in a new NAF created within Air Force Space Command.⁶⁸ If nothing else, this essay, serving as a historical primer, should raise one fundamental question in the mind of the Air Force's senior policy makers: what, exactly does the Air Force and the DOD want and need a Cyber NAF to accomplish? In other words, as the US should have learned from creating a NASA, the NRO, and the DOD's space program, *form follows function*. At least it should. The first question asked should not be, "Do we need a new organization?" but rather, "What new objectives do we need to meet and/or what emerging functions do we want to accomplish?" Only thereafter should decision makers undertake to outline the organizational structure, the form, or the agency (be it a new agency, an expanded existing agency, or any other option) which will eventually accomplish these new tasks. The Air Force appeared to be premature in crafting a Cyber Command MAJCOM *form* before definitively stating what the *function* of the service's cyberspace operations would actually be.

To a limited extent, the OSD has defined at least the new arena of electronic or information called 'cyberspace' in which the Air Force proposes its cyber NAF will operate. On 12 May 2008 Deputy Secretary of Defense Gordon England issued a memorandum stating that cyberspace was "a global domain within the information environment consisting of the interdependent network of information technology infrastructures, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers." Nevertheless, the memo emphasizes, "Because all Combatant Commands, Military Departments, and other Defense Components need the ability to operate unhindered in cyberspace, the domain does not fall within the purview of any one particular Department or Component."⁶⁹

Consequently, the Air Force pressed ahead towards creating a new MAJCOM when the Deputy Secretary of Defense had specifically stated no single service would ‘own’ cyberspace. By way of comparison, an act of Congress established NASA in 1958, and Space Command stood up with little opposition in 1982, largely because a quarter of a century had passed since the dawn of the space age and a relatively stable consensus had emerged between the services that an Air Force MAJCOM dedicated to space was appropriate.⁷⁰ In the case of AFCYBER as a MAJCOM the Air Force’s reach exceeded its grasp in having form *precede* function, not follow it. In the end, the Air Force’s ‘first out of the gate’ approach to cyberspace proved unsustainable in the face of OSD pressure and new leaders’ focus on efforts deemed of higher institutional importance. In an era in which the Air Force faces a multiplicity of several institutional challenges, to include acute personnel and financial pressures, the OSD did not look enthusiastically upon the Air Force’s efforts towards establishing a Cyber MAJCOM and ensured (through replacement of its top military and civilian leaders) the Air Force addressed other priorities first.

Therefore, as it moves towards creating a NAF for cyberspace, the Air Force at a minimum should attempt to ask the right questions, and attempt to look to the past for any appropriate guidance. Unless the Air Force begins to ask the appropriate questions based upon the principle of form following function, the organizational structure for cyberspace operations, probably a NAF, will probably continue to encounter existential difficulties at the OSD level. In other words, exactly what principles in the domain of cyberspace today are equivalent to the principles of prestige and strategic reconnaissance at the dawn of the space age? As one incisive study of the Air Force’s attempt to establish a AFCYBER MAJCOM summarized, the Air Force failed to “. . . clearly articulate what Airmen do in cyberspace and how they do it as war fighters.

. . . result[ing] in a lack of conceptual and doctrinal clarity and consensus on the ends, ways, and means of operating in cyberspace, as well as an unfocused foundation upon which to plan strategy, build and organize forces, and find resources.”⁷¹

This historical case study of the emergence of NASA, the DOD and NRO as the key pillars of America’s space program does seem to indicate that the Air Force is unlikely to quickly develop as the single, dominant player in cyberspace. Accordingly, and to the extent that the Air Force has already placed the form largely before the function, the Air Force should now focus quickly and deliberately on defining exactly what are the objectives, the operational concepts, and the fundamental reasons for operating in cyberspace. With luck, perhaps the function of Air Force operations in cyberspace will quickly catch up with whatever form is ultimately created.

ENDNOTES

¹ For a full examination of these issues see Mark A. Erickson, *Into the Unknown Together: The DOD, NASA, and Early Spaceflight* (Maxwell AFB, AL: Air University Press, 2005).

² The Air Force Portal at www.my.af.mil provides fundamental organizational data concerning the US Air Force. For instance, see the listing of Air Force MAJCOMs at <https://www.my.af.mil/gcss-af/USAF/ep/index.do?command=org&view=topLevel&type=MAJCOM&channelPageId=-901670>, as well as an AFSOC Fact Sheet at <http://www.af.mil/factsheets/factsheet.asp?fsID=156> and an AFRC Fact Sheet at <http://www.af.mil/factsheets/factsheet.asp?fsID=151>.

³ John Prime, "Cyber, Nuclear Missions Shift in Air Force," *Aimpoints*, 9 October 2008, <http://aimpoints.hq.af.mil/display.cfm?id=28814>

⁴ Satellite reconnaissance was, of course, not the totality of the DOD's space program. Over time the military services would develop orbital platforms to fulfill a variety of operational missions from space: communications, meteorology, missile warning (both strategic and tactical), detection of nuclear detonations, provision of navigational and precise timing signals, geodesy (the accurate determination and mapping of the size and shape of the earth), and surveillance (technically, whereas reconnaissance is a periodic examination of some part of the earth's surface, that is, once per hour, once per day, whatever periodicity is desired, surveillance is considered to be constant examination of a particular portion of the earth, or "staring" at a particular area) are some of the major functions of the military satellite constellation.

⁵ Eisenhower's biographer concluded that for Eisenhower's generation, "Pearl Harbor burned into their souls in a way that younger men, the leaders in the later decades of the Cold War, had not." Stephen Ambrose, *Eisenhower: Volume II, The President* (New York: Simon and Schuster, 1984), 257. Consequently, Eisenhower "... had an abiding dread of the possibility" of another surprise attack on America and detecting and preventing another surprise attack on the United States "... completely dominated his thinking about disarmament and relations with the Soviets for the next eight years." Robert H. Johnson, *Improbable Dangers: US Conceptions of Threat in the Cold War and After* (New York: St. Martin's Press, 1994), 100; R. Cargill Hall, "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," 216, in John M. Logsdon, Linda J. Lear, Janelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, Editors, *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program*, Volume 1, *Organizing for Exploration* (Washington, DC: Government Printing Office (USGPO), 1995).

⁶ Oral history interview of James Killian, November 9, 1969 through July 16, 1970, Dwight D. Eisenhower Library (DDEL), Abilene, Kansas, 14.

⁷ Technological Capabilities Panel (TCP) final report, "Meeting the Threat of Surprise Attack: The Report to the President by the Technological Capabilities Panel of the Science Advisory Committee," volume one, February 14, 1955, Space Policy Institute of George Washington University, Washington, DC (SPI) document 1410, v.

⁸ Killian records how in a March 27, 1954 SAC meeting Eisenhower discussed "... the danger of a surprise attack on the United States and stressed the high priority he gave to reducing the probability of military surprise. ... This fear. ... haunted Eisenhower throughout his presidency." James R. Killian, Jr., *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge, MA: The MIT Press, 1977), 68.

⁹ In addition, the TCP's reasoned analysis of the threat of surprise attack divided the immediate future into four phases and recommended specific actions for each to minimize the risk; it correctly foretold how by phase four, possibly within a decade, both the United States and USSR would be able to destroy each other and neither could achieve an advantage in a nuclear exchange assuming one side did not develop ballistic missiles before the other. However, the United States would be in grave peril if the Soviets developed these weapons first. In addition

to the IRBM and U-2 recommendations, the TCP suggested dispersal of the American bomber force, extension of the Distant Early Warning line, and numerous research and development projects. TCP final report, 1-38.

¹⁰ Unfortunately, the entire Part V, "Intelligence," of the TCP report dealing with intelligence gathering remains classified, pp. 133-152; this includes the entire space and satellite related sections. This excerpt comes from Killian's memoirs, *Sputnik, Scientists, and Eisenhower*, 79. Other excerpts can be found cited in documents created by associated governmental agencies such as the NSC. Also of general importance from the TCP is the fact that there was not one leak associated with it; this greatly pleased Eisenhower, who grew to increasingly trust the scientists associated with the TCP effort, especially Killian, and set the stage for Eisenhower to task Killian after *Sputnik* with creating an organizational structure for the space program under civilian control, that is, NASA. See Killian, 67, 86.

¹¹ Alex Roland, *Model Research: The National Advisory Committee for Aeronautics, 1915-1958, Volume I*, NASA SP-4103 (Washington, DC: USGPO, 1985), 280. Roland discusses the TCP in the context of NACA's history to explain the context in which NACA's budget stabilized in the mid-1950s after falling for several years. Roland sees the TCP as an indication of Eisenhower's increasing concern with American scientific and technological progress and one result from this was the stabilizing of NACA's budget. The NACA was the predecessor civilian organization to NASA and around which NASA was built and expanded after October 1, 1958.

¹² NSC 5520, May 20, 1955, SPI document 86, pp. 2, 3, 4, 6, 11. Emphasis added. Most of NSC 5520 is reprinted in *Exploring the Unknown*, Volume I, but the version on file at SPI includes additional material resulting from declassification actions.

¹³ For instance, the Air Force had tasked RAND Corporation with a three-week deadline to study the issue of satellite feasibility. In a seminal report of May 1946 RAND conducted a technical and engineering analysis of the possibilities of an artificial earth satellite and concluded it was entirely feasible. This report also contained complete designs of two proposed vehicles. RAND stated

It is concluded that modern technology has advanced to a point where it now appears feasible to undertake the design of a satellite vehicle. . . . Such a vehicle will undoubtedly prove to be of great military value. . . . There is good reason to hope that future satellite vehicles will be built to carry human beings. . . . The achievement of a satellite craft by the United States would inflame the imagination of mankind, and would probably produce repercussions in the world comparable to the explosion of the atomic bomb. . . .

RAND believed a satellite would cost \$150 million dollars and require five years of research and development. It recommended the Air Force contract with RAND to continue its effort toward a satellite because ". . . there is good reason to hope that future satellite vehicles will be built to carry human beings." Douglas Aircraft Corporation, RAND Corporation, "Preliminary Design of an World-Circling Spaceship," Report No. SM-11827, May 2, 1946, in Logsdon, Lear, Warren-Findley, and Day, eds., *Exploring the Unknown*, Volume I, 236, 238, 239. The best concise account of these early satellite studies by the military services is R. Cargill Hall, "Early U.S. Satellite Proposals," *Technology and Culture*, Vol. IV, No. 4 (Fall, 1963): 410-434.

¹⁴ General Operational Requirement No. 80 cited from Merton E. Davies and William R. Harris, *RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related US Space Technology* (Santa Monica, CA: The RAND Corporation, 1988), 61. The Air Force opened a design competition code named Pied Piper between the RCA Corporation, Glenn L. Martin Company, and Lockheed Aircraft. On October 29, 1956 Lockheed received the development contract. From this point, the program was generally referred to as WS-117L and "the military satellite program was now committed to development and testing of actual satellites." Bruno W. Augenstein, Appendix 1, "Evolution of the U.S. Military Space Program, 1945-1960: Some Events in Study, Planning, and Program Development," in Yuri Ra'anana and Robert L. Pfaltzgraff, Jr., editors, *International Security Dimensions of Space* (Hamden, CT: Archon Books, 1984), 275.

¹⁵ Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 13.

¹⁶ Dwayne Day, "CORONA: America's First Spy Satellite Program," *Quest: The History of Spaceflight Magazine* 4 (Summer 1995): 9.

¹⁷ One Air Force history elaborates that WS-117L

ran into two difficulties. First, the economic policy cutting research and development funds had crippled the project badly. The most valiant efforts of AFBMD [Air Force Ballistic Missile Division], ARDC [Air Research and Development Command] and Headquarters USAF came to nothing. Worse, top officials within the offices of the Secretary of Defense . . . [such as] The Secretary of the Air Force showed academic interest but warned that insistence [on more funding] would create unfavorable repercussions at high political levels.

Lee Bowen, *An Air Force History of Space Activities, 1945-1959* (Washington, DC: USAF Historical Division Liaison Office (HDLO), 1964, SHO-C-64/50), 48. Secretary of Defense Charles Wilson's attitude is best seen by his remark on December 17, 1954 when asked to react to the suggestion that the Soviets might orbit a satellite before the United States: "I wouldn't care if they did." Bowen, 69. Air Force General Bernard A. Schriever, regarded as the motive force behind the development of both the Air Force's ICBMs and the Air Force's space program, recalls making a speech in San Diego in February 1957 describing AF research and development into space-related topics and how 90 percent of the unmanned satellite missions in space could be undertaken with the propulsion, guidance, and structural techniques being developed in the USAF ballistic missile program. ". . . I was ordered the next day by Wilson himself not to use the word space in any of my speeches in the future." Oral history interview of Schriever, 29 June 1977, K239.0512-1492, Maxwell AFB, AL: Air Force Historical Research Agency (AFHRA), 7; and Ernest G. Schwiebert, "USAF Ballistic Missiles: 1954-1964," *Air Force/Space Digest* (May 1964): 160-161. Schriever also relates how that same month he was "pounding the halls" of the Pentagon in an attempt to secure \$10 million for the WS-117L program. He finally got it but ". . . with the instructions that we could not use that money in any other way except for component development. No systems work whatsoever. Ten million dollars!" Cited in Jacob Neufeld, editor, *Research and Development In the United States Air Force* (Washington, DC: Center for Air Force History, 1993), 88; Schwiebert, 160. Schriever concluded, "As a result, our situation was not conducive to moving rapidly into space in early 1957, although there was serious intent on the part of the Air Force to exploit space for national security purposes. When Sputnik came along in October, the floodgates opened." General Bernard A. Schriever, "Comments," in Allan A. Needell, editor, *The First 25 Years in Space* (Washington, DC: Smithsonian Institution Press, 1983), 28.

¹⁸ Davies and Harris, 95; and Robert A. Divine, *The Sputnik Challenge* (New York and Oxford: Oxford University Press, 1993), 11.

¹⁹ *Ibid.*, 29.

²⁰ One must not overlook the fact that the primary reason that ballistic missiles were generously funded by Eisenhower was the nuclear deterrent value they provided when fielded and operationally ready to launch against the Soviet Union. Their availability and usability as space boosters was initially a secondary benefit that proved increasingly valuable over time.

²¹ NASA's budget in 1960 (the final full year over which the Eisenhower administration had control) was \$3.2 billion (while the DOD's space budget that same year was \$3.9 billion). At the height of spending for Apollo in 1965 NASA received \$33.5 billion, a ten-fold increase (while the DOD's space budget had risen to \$10.3 billion, a three-fold increase). Note that in 1960 the DOD's space budget was roughly 20 percent larger than NASA's, but five years later NASA's budget was three times that of DOD's space allocations. See Tamar A. Melhuron, compiler, "2006 Space Almanac," *Air Force Magazine* (Volume 89, Number 8, August 2006): 70.

²² Cited in Richard Witkin, *The Challenge of the Sputniks* (New York: Doubleday, 1958), 6. Similarly, trade representative Clarence Randall referred to *Sputnik* as a "silly bauble" while Secretary of Defense Wilson said it was "a neat scientific trick" but, "Nobody is going to drop anything down on you from a satellite while you are

sleeping, so don't start to worry about it." Cited in Lyndon B. Johnson, *The Vantage Point: Perspectives on the Presidency, 1963-1969* (New York: Holt, Rinehart and Winston, 1971), 273.

²³ Oral history interview of George B. Kistiakowsky, May 22, 1974, folder: Kistiakowsky, box: Emme/Roland interviews on early NASA history, shelf V-A-1, Washington, DC: NASA Historical Data Research Collection (NHDRC), 37.

²⁴ Memorandum of Discussion at the 470th Meeting of the NSC, box 13, NSC series, Ann Whitman file, DDEL, 4-5.

²⁵ Ibid., 5-6.

²⁶ T. Keith Glennan, *The Birth of NASA: The Diary of T. Keith Glennan*, NASA SP-4105 (Washington, DC: USGPO, 1993), 292.

²⁷ Memorandum of Discussion at the 470th Meeting of the NSC, 6.

²⁸ John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Mass. and London, England: The MIT Press, 1970), 37.

²⁹ The historian need go no further in answering these questions than John Logsdon's *The Decision to Go to the Moon*. This deservedly classic treatment details every facet of Kennedy's decision and its ultimate impact. The present author does not pretend to offer new insights beyond Logsdon's theses but will simply attempt, in a very cursory manner, to summarize the fundamentals of Kennedy's momentous decision to initiate a lunar landing program.

³⁰ Eugene M. Emme, "Historical Perspectives on Apollo," *Journal of Spacecraft and Rockets* 5 (April 1968): 378. One team of scholars says Gagarin's flight was a "crushing disappointment to many Americans," that Congress was "stampeded" by the flight, and that the flight "... provided a tremendous impetus to the desires of Americans ... to become first once again." Loyd S. Swenson, James M. Grimwood, and Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201 (Washington, DC: USGPO, 1966), 334-35.

³¹ Cited by W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995), 93. Khrushchev further gloated about Gagarin, "This victory is another triumph of Lenin's idea, confirmation of the correctness of the Marxist-Leninist teaching. ... This exploit marks a new upsurge of our nation in its onward movement towards communism." Cited in Jay Holmes, *America on the Moon: The Enterprise of the Sixties* (New York: J.B. Lippincott Co., 1962), 84.

³² Kennedy, News Conference, April 12, 1963, *Public Papers of the President, 1961*, (Washington, DC: USGPO, 1962), 262-63.

³³ Kennedy, Memorandum for Vice President Lyndon B. Johnson, April 20, 1961, *Exploring the Unknown, Volume I*, 424.

³⁴ Kennedy, News Conference, April 21, 1961, *Public Papers of the President, 1961*, 310-311. The second portion of the citation is the first and only time the author has been able to discover in which JFK stated very explicitly the concept of beating the Russians to the moon. When Kennedy signed the amendment to the Space Act on April 25 making the vice president the head of the NASC, Kennedy said it was a "... key step toward moving the United States into its proper place in the space race. ... I intend that America's space effort shall provide the leadership, resources, and determination necessary to step up our efforts and prevail on the newest of man's physical frontiers." Kennedy, Statement upon signing HR 6169, 25 April 1961, *ibid.*, 321-22.

³⁵ James E. Webb and Robert S. McNamara, Memorandum for Vice President Lyndon B. Johnson, Recommendations for Our National Space Program: Changes, Policies, Goals, May 8, 1961, *Exploring the*

Unknown, Volume I, 441, 444, emphasis in original. Parts of the document not reprinted in *Exploring the Unknown* can be found in SPI document 300.

³⁶ In addition to the lunar landing proposal, the package also recommended the United States develop: a worldwide operational satellite communications capability; a worldwide satellite weather prediction system; and the large scale boosters, both solid- (by the DOD) and liquid-fueled (by NASA) because of their potential military use and their obvious necessity in the lunar landing effort. These large rockets were the DOD's only real non-prestige-related interest in the accelerated program: "It is certain . . . that without the capacity to place large payloads reliably into orbit, our nation will not be able to exploit whatever military potential unfolds in space." SPI document 300 version of the May 8, 1961 report, 16. However, even in the context of this document devoted to laying out a plan for increasing America's prestige via space projects, the authors felt necessary to highlight the crucial role of reconnaissance. On page 24 the report stated, "The existence of the Iron Curtain creates an asymmetry in military needs between the U.S. and the Soviet Union which compels us to undertake a number of military missions utilizing space technology that would appear to be unneeded by the USSR. We have in the past and are likely in the future to continue to feel the need for reconnaissance. The SAMOS project is intended to fill this need." McNamara and Webb stated that SAMOS, the Midas program for the "earliest possible warning of ballistic missile attack" and the DISCOVERER program made for a three-way American investment in reconnaissance satellites exceeding a billion dollars.

³⁷ Logsdon, *Decision*, 126.

³⁸ Kennedy, Special Message to the Congress on Urgent National Needs, May 25, 1961, *Public Papers of the President, 1961*, 396-403.

³⁹ Kennedy made it perfectly clear that this would be ". . . a course which will last for many years and carry heavy costs. . . . If we are to go only half way, or reduce our sights in the face of difficulty, in my judgment it would be better not to go at all. . . . I believe we should go to the moon. But I think every citizen of this country as well as the Members of Congress should consider the matter carefully in making their judgment . . . because it is a heavy burden. . . ." Ibid., 403-05.

⁴⁰ NASA, News Release No. 61-115, May 25, 1961, folder: JFK - Miscellaneous Clippings, box: White House, Presidents, Kennedy, Biography materials, NHDRC, 5-6. In addition to Webb, also present were NASA Deputy Administrator Hugh Dryden and NASA Associate Administrator Robert Seamans.

⁴¹ Logsdon, *Decision*, 134, 162.

⁴² Cited in Walter McDougall, "Technocracy and Statecraft in the Space Age - Toward the History of a Saltation," *American Historical Review* 87 (October 1982): 1025.

⁴³ Logsdon, *Decision*, 164.

⁴⁴ Jeffrey Richelson, "From CORONA to LACROSSE: A Short History of Satellites," *Washington Post*, 25 February 1990, B1. After the official declassification of the existence of the NRO in 1992, the NRO eventually declassified many details concerning its first generation reconnaissance satellite, CORONA. For specific CORONA histories see Dwayne A. Day, John M. Logsdon, and Brian Latell, editors, *Eye in the Sky: The Story of the Corona Spy Satellite* (Washington, DC: Smithsonian Institution Press, 1998) and Curtis Peebles, *The Corona Project: America's First Spy Satellites* (Annapolis, MD: Naval Institute Press, 1997). In addition, cursory information is available on the NRO's website at <http://www.nro.gov/>.

⁴⁵ For the specifics of this process and the questions considered see Gerald Haines, "The National Reconnaissance Office: Its Origins, Creation, and Early Years," in Day, Logsdon and Latell, *Eye in the Sky*, 143-156, as well as the numerous other valuable chapters in that book. Haines was the first person to serve as NRO Historian, a position only created after the existence of the NRO was declassified in 1992. See also Kenneth E. Greer, "CORONA," *Studies in Intelligence*, Supplement 17 (Spring 1973) in Kevin C. Ruffner, editor, *CORONA*:

America's First Satellite Program, CIA Cold War Records (Washington, DC: Center for the Study of Intelligence, 1995) for useful information applicable to CORONA's history.

⁴⁶ Albert D. Wheelon, "Lifting the Veil on CORONA," *Space Policy* 11 (November 1995): 251. Wheelon served as the CIA's first Deputy Director for Science and Technology starting in 1963 and it was under his leadership that the CORONA program flourished.

⁴⁷ Oral history interview of Schriever, July 2, 1996, by the author; Lockheed Corporation, Lockheed Press Release, CORONA Program Profile, May 1995, SPI unnumbered document, 2. Lockheed was a prime contractor on the CORONA program whose functions included technical adviser, integrator of all CORONA equipment other than the Thor booster, developing the Agena upper stage, and leading the test, launch, and on-orbit control operations. When CORONA was finally declassified in 1995, Lockheed received permission to release a history of the CORONA program. This press release is a synopsis of that history.

⁴⁸ Haines, 147.

⁴⁹ George B. Kistiakowsky, *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology* (Cambridge, MA and London: Harvard University Press, 1976), 45, 196, 245.

⁵⁰ Eisenhower, Letter to Gates, June 10, 1960, folder: Reconnaissance Satellites 1960, box 15, Executive Secretary Subject File subseries, NSC Staff Paper Series, White House Office, DDEL, 1. Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 45.

⁵¹ Kistiakowsky, *Scientist at the White House*, 387.

⁵² Dudley Sharp, Memorandum for the Chief of Staff, USAF, September 13, 1960, folder: 4-5 Missiles/Space/Nuclear, box 36, Thomas White papers, Library of Congress (LOC), 1-2.

⁵³ Haines, 149-150. The NRO Historian position was only created in 1995 and this cited chapter is the first product of that new office. Numerous secondary sources, however, have discussed the basic facts surrounding the NRO's creation and have pointed out the fact that the NRO sprang from the Office of Missile and Satellite Systems: see Richelson, *Secret Eyes*, 47; David Spires, chapter 2, "From Eisenhower to Kennedy: The National Space Program and the Air Force's Quest for a Space Mission, 1958-1961," in *Beyond Horizons: A Half Century of Air Force Space Leadership* (Peterson AFB, CO: Air Force Space Command and USGPO, 1997); R. Cargill Hall, "The Eisenhower Administration and the Cold War: Framing American Astronautics to Serve National Security," *Prologue: Quarterly Journal of the National Archives* 27 (Spring 1995): 68; and Paul Stares, *The Militarization of Space: U.S. Policy, 1945-1984* (Ithaca, NY: Cornell University Press, 1985), 46.

⁵⁴ Eisenhower declared, "I hereby direct that the products of satellite reconnaissance, and information of the fact of such reconnaissance . . . shall be given strict security handling under the provisions of a special security control system approved by me. I hereby approve the TALENT-KEYHOLE Security Control System for this purpose." Eisenhower emphasized that anyone with access to what became known as "TK" information was strictly prohibited from ". . . imparting any information within this system to any person not specifically known to them to be on the list of those authorized to receive this material." Eisenhower, Memorandum to the Secretaries of State and Defense, the Attorney General, the Chairman of the AEC, and the Director of Central Intelligence, August 26, 1960, reprinted in Kevin C. Ruffner, editor, *CORONA: America's First Satellite Program*, CIA Cold War Records (Washington, DC: Center for the Study of Intelligence, 1995), 75.

⁵⁵ A DOD official explained to Kennedy that the information the DOD planned to release to the media on upcoming SAMOS launches ". . . represents a severe reduction from what had previously been issued. Eliminated entirely from former procedures are four pages comprising 22 questions and answers. Press briefings before and after launching have been eliminated." The Assistant Secretary of Defense for Public Affairs, Arthur Sylvester, stated "Dr. Charyk has reviewed these changes and is satisfied that they meet all his security requirements and those of his SAMOS Project Director." Joseph Charyk was Undersecretary of the Air Force in the late Eisenhower and

early Kennedy administrations. Traditionally, the individual occupying this position has served as the NRO Director. Arthur Sylvester, Office of the Assistant Secretary of Defense for Public Affairs, Memorandum for Kennedy, January 26, 1961, National Security Archival Collection: Military Uses of Space (NSA MUS) document 639, 1. Assistant Secretary Sylvester summarized for the President, "This readjustment is a big step toward the gradual reduction of volunteering information on our intelligence acquisition systems which Mr. McNamara informed me is your desire." Clearly Kennedy offered no objections to the new policy, given the fact he apparently initiated it through McNamara.

⁵⁶ The OSD (Office of the Secretary of Defense) issued a classified directive, S-5200.13, Security and Public Information Policy for Military Space Programs, in March 1962 which stated, "Adequate protection of military space programs is vital to the security of the United States. This requires the capability to launch, control, and recover space vehicles without public knowledge of the timing of these actions or of the specific missions involved. It is impractical to selectively protect certain military space programs while continuing an open policy for others since to do so would emphasize sensitive projects." Therefore in the future *all* military space projects, vehicles, and launches would be identified only "by means of numerical or alphabetical designators selected and assigned at random;" no nicknames could be used. All public information releases had to be cleared through the OSD public affairs office. All reports, plans, and other documents relating to all military space programs "will be severely limited and controlled." The number of people with access to information concerning military space programs was to be reduced. DOD Directive S-5200.13, Security Policy for Military Space Programs, March 23, 1962, folder: Defense 1962, box 17, RG 220, Records of the National Aeronautics and Space Council, National Archives and Records Administration (NARA), 1-3.

⁵⁷ Official, on-the-record acknowledgment of United States reconnaissance satellites did not come until President James E. Carter declared at the Kennedy Space Center on October 1, 1978: "Photographic reconnaissance satellites have become an important stabilizing factor in world affairs in the monitoring of arms control agreements. They make an immense contribution to the security of all nations. We shall continue to develop them." *Public Papers of the President, 1978*, volume 2, (Washington, DC: USGPO, 1979), 1686.

⁵⁸ The particulars of the administration's justification for tightening the policy of secrecy surrounding reconnaissance satellites as well as the USSR's campaign against them (and its cessation) are not germane to this study. For full details see: William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Berkley Books, 1986), 105ff.; Paul B. Stares, *The Militarization of Space*, 66ff.; Gerald M. Steinberg, *Satellite Reconnaissance: The Role of Informal Bargaining* (New York: Praeger Publishers, 1983), 44ff.; Philip J. Klass, *Secret Sentries in Space* (New York: Random House, 1971), 126ff; and Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 75ff.

⁵⁹ The Kennedy administration's official policy concerning satellite reconnaissance that emerged in 1962 has been partially declassified at the author's request. Kennedy signed NSAM 156 (no title) on May 26, 1962. In it he explained, "We are now engaged in several international negotiations on disarmament and peaceful uses of outer space. . . . They raise the problem of what constitutes legitimate use of outer space, and in particular the question of satellite reconnaissance. In view of the great national security importance of our satellite reconnaissance programs, I think it desirable that we carefully review these negotiations with a view to formulating a position which avoids the dangers of restricting ourselves, compromising highly classified programs, or providing assistance of significant military value to the Soviet Union and which at the same time permits us to continue to work for disarmament and international cooperation in space." NSAM 156, no title, May 26, 1962, folder: NSAM 136-156, box 3, RG 59, General Records of the Department of State, NARA, 1. Declassification date: December 31, 1996. One document from August 1962 made clear the impact that the subsequent report from the NSAM 156 Committee (apparently not yet fully declassified) had on Kennedy. In it the White House staff explained that Kennedy wanted American space policy to "be forcefully explained and defended" at forthcoming UN meetings, with an emphasis on three points. First, "To show that the distinction between peaceful and aggressive uses of outer space is not the same as the distinction between military and civilian uses, and that the U.S. aims to keep space free from aggressive use and offers cooperation in its peaceful exploitation for scientific and technological purposes." Second, "To build and sustain support for the legality and propriety of the use of space for reconnaissance." Finally, "To demonstrate the precautionary character of the U.S. military program in space." NSAM 183, Explanation and Defense of US Space Program, August 27, 1962, signed by McGeorge Bundy, folder: NSAM 136-156, box 3, RG 59, General Records of

the Department of State, NARA, 1. Declassification date: December 31, 1996. Clearly the NSAM 156 Committee's recommendations had been accepted by Kennedy and served as the core of his "marching orders" to the American diplomats at the UN. The NSAM 156 Committee's recommendations were the only official, written space policy document concerning reconnaissance satellites to emerge from the Kennedy administration.

⁶⁰ However, Wheelon stated, "The debate between CIA and DOD then shifted in 1963 to whether CIA ought to pursue new reconnaissance systems." OSD officials such as Assistant Secretary of Defense Eugene Fubini and McMillan "... argued against each system that CIA was developing." This debate continued until 1965 when Alexander Flax became the NRO's Director; Flax "... saw the CIA and the Air Force as valuable and complementary assets." Wheelon reported the OSD/AF-CIA difficulties within the NRO faded from that point forward. Albert D. Wheelon, "Lifting the veil on CORONA," *Space Policy* 11 (November 1995): 252-53.

⁶¹ Evert Clark, "Satellite Spying Cited by Johnson," *New York Times*, March 17, 1967, 13. Also in the *Washington Post* of March 18, 1967. The only unclassified primary source document readily available concerning the NRO in the Johnson administration is DOD Directive 5105.23, "National Reconnaissance Office," March 27, 1964. It was apparently the end product of the intra-NRO squabbling between the Air Force and the CIA outlined above. This directive stated the NRO was "an operating agency of the Department of Defense, under the direction and supervision of the Secretary of Defense." It was responsible for "consolidation of all Department of Defense satellite and air vehicle overflight projects for intelligence into a single program ... and for the complete management and conduct of this Program in accordance with policy guidance and decisions of the Secretary of Defense." By 1964, the blackout of information on the satellite reconnaissance program was complete: "All communications pertaining to matters under the National Reconnaissance Program will be subject to special systems of security control. ... with the single exception of this directive, no mention will be made of the ... National Reconnaissance Program [or] National Reconnaissance Office. Where absolutely necessary to refer to the National Reconnaissance Program in communications not under the prescribed special security systems, such reference will be made by use of the terminology: 'Matters under the purview of DOD TS-5105.23.'" DOD, Department of Defense Directive 5105.23, National Reconnaissance Office, March 27, 1964, in Logsdon et. al., eds., *Exploring the Unknown*, Volume I, 373-75. Beyond this single document, all other statements concerning the NRO and reconnaissance satellites from the Johnson era are from secondary sources and thus by definition have an element of speculation and conjecture.

⁶² Philip J. Klass, "Military Satellites Gain Vital Data," *Aviation Week and Space Technology* (September 15, 1970): 55. "Real-time" is a term meant to describe a process whereby the reconnaissance images are digitally transmitted to ground stations virtually simultaneously, or with very minimal delay, and are shortly thereafter made available to national policy makers. In 1970 the traditional method of data return continued in operation: dropping the film inside canisters from the satellite back toward the surface of the earth to be aurally recovered and then processed and manually delivered to decision makers.

⁶³ All Klass citations in this paragraph from Philip Klass, "Big Bird Nears Full Operational Status," *Aviation Week and Space Technology* (25 September 1972): 17.

⁶⁴ Jeffrey Richelson concluded that the KH-9 was initially developed as a back-up to the Air Force Manned Orbiting Laboratory (MOL - a cylinder with approximately 1,500 cubic feet of living space for two military astronauts in which to conduct intelligence gathering from space) and then in fact did become the nation's primary system when MOL was canceled in June 1969. The KH-9 satellite supposedly weighed 30,000 pounds, measured fifty by ten feet and featured not only conventional photographic cameras, but also infrared and other multispectral systems. Jeffrey Richelson, "The Keyhole Satellite Program," *The Journal of Strategic Studies* 7 (June 1984): 135. Probably the first author to postulate that the KH-9/Big Bird was begun as a back-up to the MOL was Curtis Peebles, "The Guardians," *Spaceflight* 20 (November 1978): 381. Richelson also calculated that the KH-9 had two cameras with sixty-inch lenses that produced 24-inch resolution over an 80 by 360 mile swath of territory and carried four film canisters instead of two. Jeffrey Richelson, *America's Secret Eyes*, 106. Another analyst stated that by 1972, "... military reconnaissance satellites in the Keyhole series had resolutions on the order of three inches." William Burrows, "A Study of Space Reconnaissance: Methodology for Researching a Classified System," in Martin J. Collins and Sylvia D. Fries, editors, *A Spacefaring Nation: Perspectives on American Space History* (Washington, DC: Smithsonian Institution Press, 1991), 227. If those descriptions were even generally

true, the MOL faced a formidable competitor in the NRO's robotic (unmanned) reconnaissance satellites, especially considering the extra weight and expense of the MOL generated by the life support equipment necessary to support humans in orbit.

⁶⁵ J.S. Butz, Jr., "Under the Spaceborne Eye: No Place to Hide," *Air Force and Space Digest* (May 1967): 93. Emphasis in original.

⁶⁶ Gerald Haines, "The National Reconnaissance Office (NRO): Its Origins, Creation, and Early Years," in Dwayne A. Day, John M. Logsdon, and Brian Latell, editors. *Eye in the Sky: The Story of the Corona Spy Satellite* (Washington, DC: Smithsonian Institution Press, 1998), 154-55.

⁶⁷ Air Force Cyber Command Implementation Plan, <https://www.my.af.mil/gcss-af/USAF/AFP40/d/1076201278/Files/editorial/AFCYBERPADCh1Signed.pdf?channelPageId=-2057421&programId=1422856>, page 1.

⁶⁸ Marina Malenic, "Air Force Scraps Plans for Cyber Command in Favor of New Nuclear Command," *Aimpoints*, 10 October 2008, <http://aimpoints.hq.af.mil/display.cfm?id=28850>.

⁶⁹ Deputy Secretary of Defense Gordon England, "The Definition of 'Cyberspace,'" Memorandum for Secretaries of the Military Departments et. al., 12 May 2008,

⁷⁰ For a full account see Spires, *Beyond Horizons*, chapter 5.

⁷¹ Major General Stephen J. Miller, "Foreward" to Sebastian M. Convertino II, Lou Anne DeMattei, Tammy M. Knierim, *Flying and Fighting in Cyberspace* (Maxwell Air Force Base, AL: Air University Press, July 2007), Maxwell Paper No. 40, iii.

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